



# Harford County

Department of Public Works  
Water Resources Engineering

## Stormwater Management Program

# Stormwater Act of 2007

## Requirements

- Stormwater quantity, quality control and groundwater recharge must be provided using Environmental Site Design (ESD)
  - Environmental Site Design – is the use of small-scaled stormwater management practices and nonstructural techniques to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources

# Implementation Schedule

- Draft revised Code to MDE  
- November 11, 2009

November 2009						
Su	M	Tu	W	Th	F	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

- Adopted by municipalities  
- May 4, 2010

May 2010						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

# Stormwater Act of 2007 Types of ESD Practices

## ALTERNATIVE SURFACES

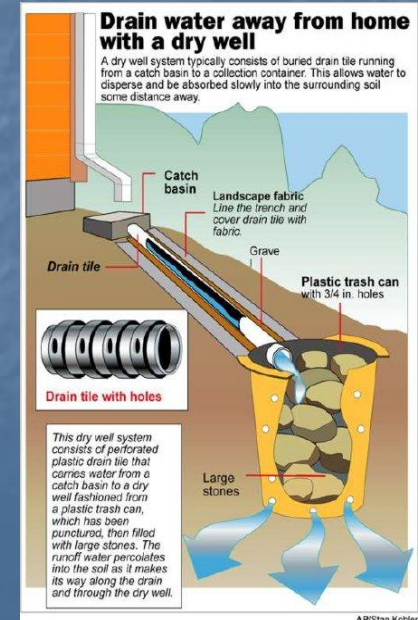
- Green roofs
- Permeable pavements

## NON STRUCTURAL MEASURES

- Disconnection of rooftop runoff
- Sheetflow to conservation areas

## MICRO SCALE PRACTICES

- Rainwatering harvesting
- Dry wells
- Landscape infiltration & wetlands
- Rain gardens
- Infiltration swales & berms

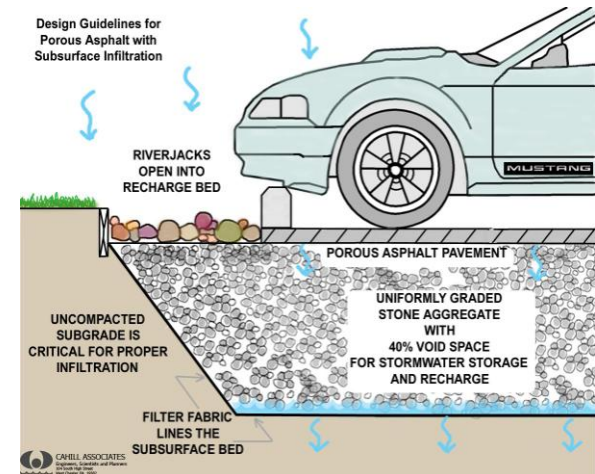


# Permeable Pavements

Designed to perc 8" per hour into the subbase

Must be setback at least 10' away from a building

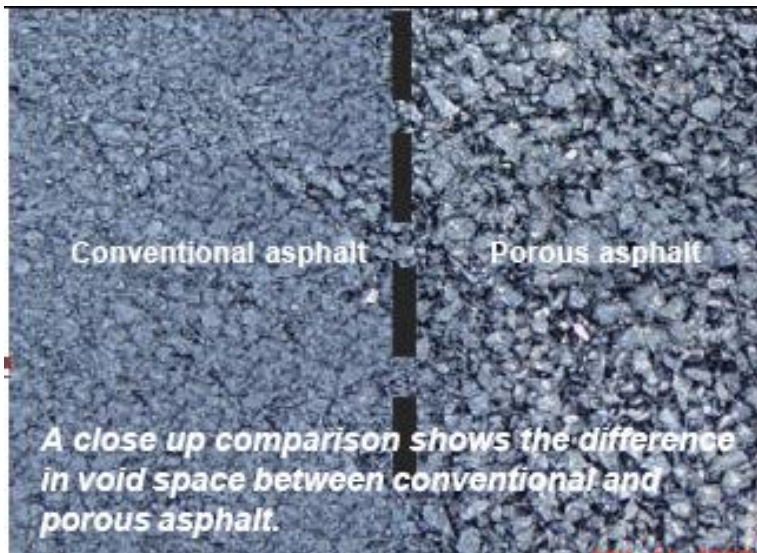
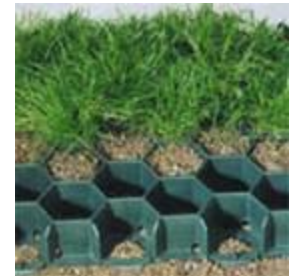
Use must be shown on the landscaping plans. **Trees and shrubs are not to be located adjacent to asphalt and concrete because of root penetration and clogging from leaves**





Pervious Concrete

Permeable Pavers



Pervious Asphalt



# Permeable Pavements

## Maintenance:

- Surfaces to be swept and vacuumed to reduce sediment accumulation at least twice a year by a commercial cleaning unit. Washing systems and compressed should not be used to perform surface cleaning.
- Drainage pipes, inlets, stone edge drains within or draining to the subbase must cleaned out regularly.
- Prevent heavy vehicles from tracking and spilling material onto the pavement.
- If using a deicer, apply calcium magnesium acetate or pretreated salt. Set snow plow blades 1" above normal and do not direct plowed snow piles or snow melt into the pavement

# Reinforced Turf

Open load bearing matrix within a vegetated or gravel surface

Load bearing is less than conventional pavements (light duty)

Use must be shown on the landscaping plans. **Trees and shrubs are not to be located adjacent to asphalt and concrete because of root penetration and clogging from leaves**

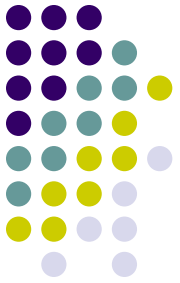




# Reinforced Turf

## Maintenance:

- Mow regularly and remove clippings from the area
- Drainage pipes, inlets, stone edge drains within or draining to the subbase must be cleaned out regularly.
- Prevent heavy vehicles from driving onto the turf

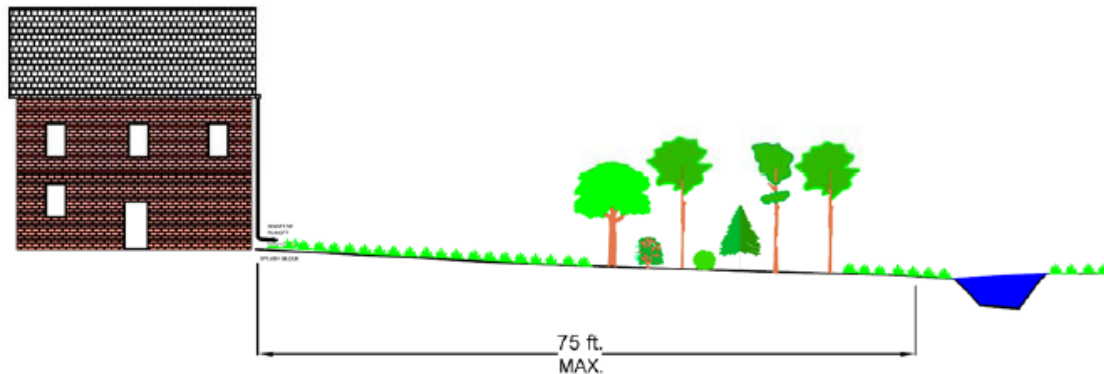


# Disconnected Rooftop

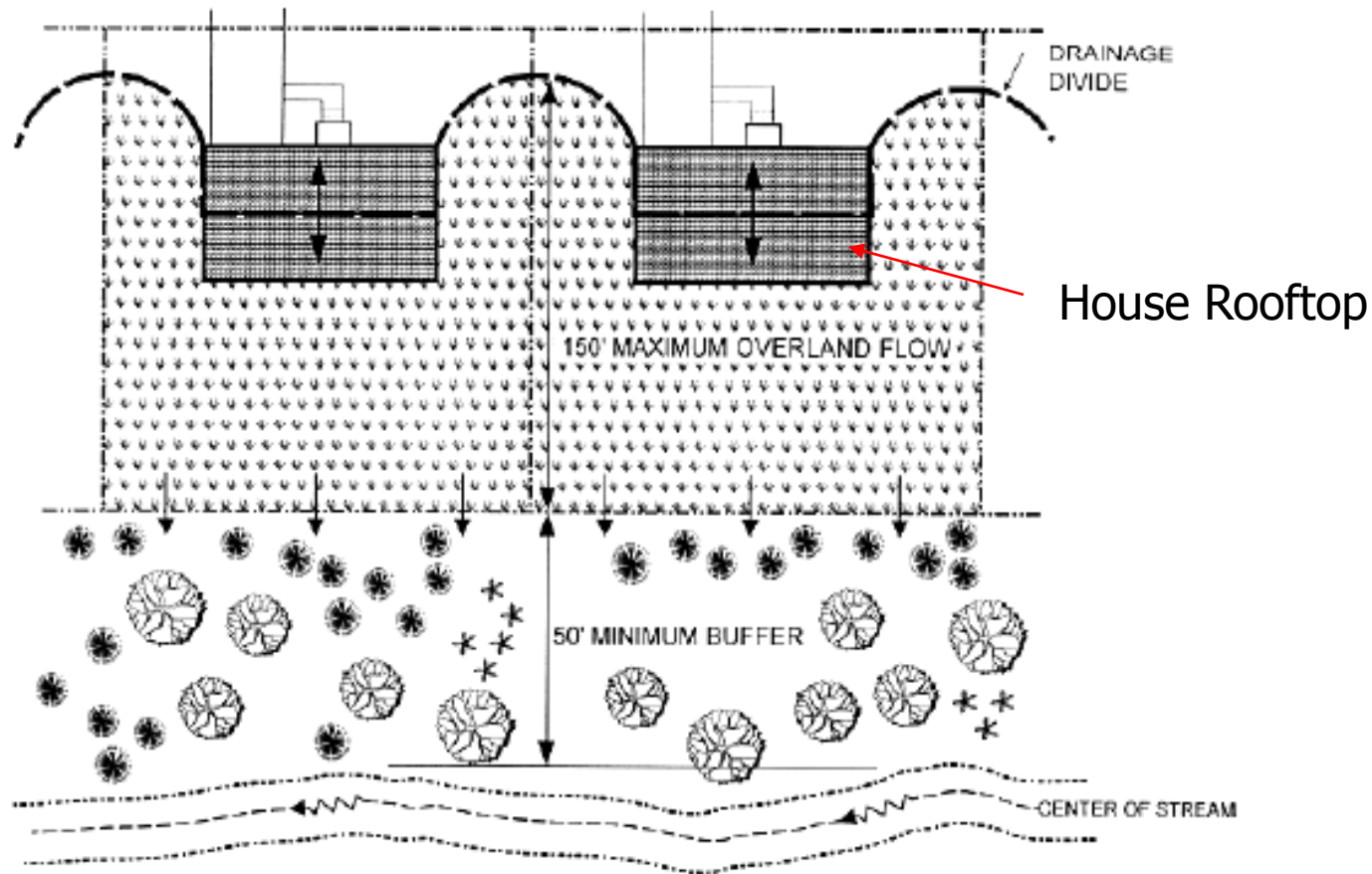
Direct flow from downspouts onto **vegetated areas** where it can soak or filter into the ground

Use must be shown on the landscaping plans.

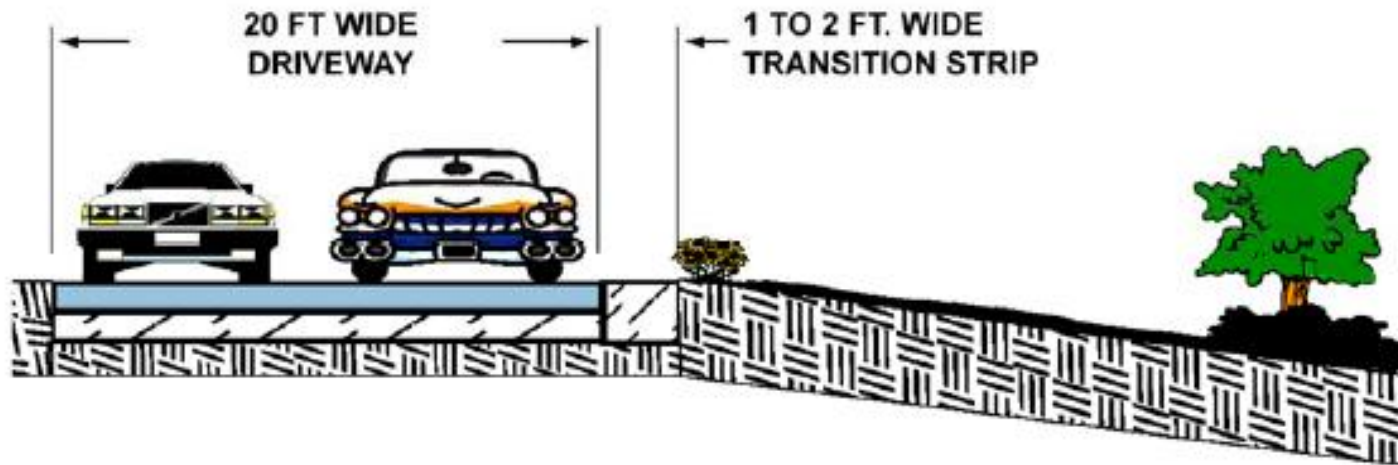
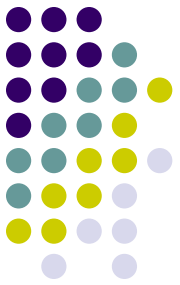
Flow path length is between 10'–75'



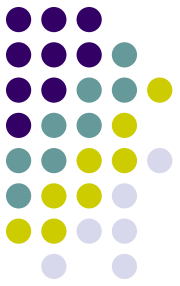
# Sheet Flow to Conservation Areas



# Disconnected Rooftop

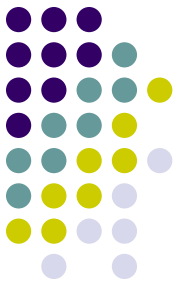


# Disconnected Rooftop and Sheet Flow to Conservation Areas



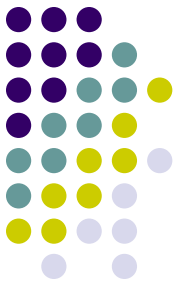
## Maintenance:

- Mow; same maintenance requirements as for lawns
- Do not remove and replace with impervious paving



# Non-Rooftop Disconnect

- Runoff conveyed as sheet flow onto and across open areas
- Use must be shown on the landscaping plans.
- Protect against future compaction – plant trees or shrubs along perimeter
- Commercial areas - Discourage high foot traffic



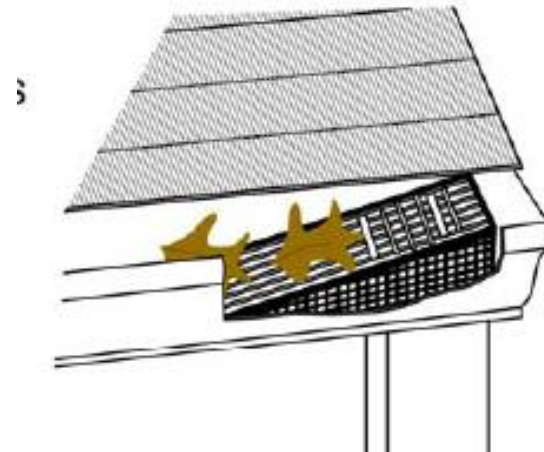
# Rainwater Harvesting

- Cisterns and rain barrels



## Gutter Protection

GUTTER DRAIN FILTER OR SIMILAR  
(OPTIONAL)

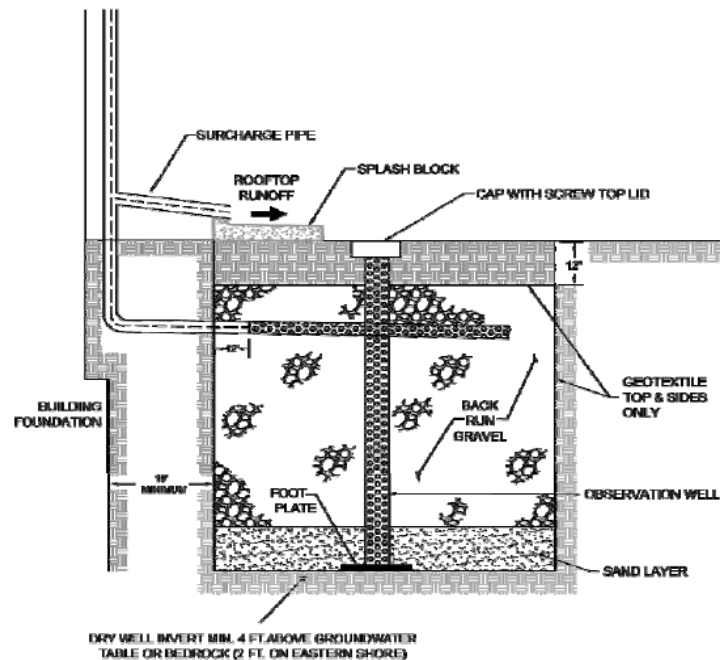


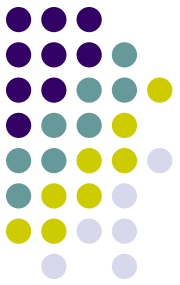
# Drywells



## Maintenance:

- Inspected and cleaned annually – pipes, gutters, downspouts, filters
- Drains in 48 hours. If sediment height is 6" or more or ponding occurs, the gravel must be excavated and replaced



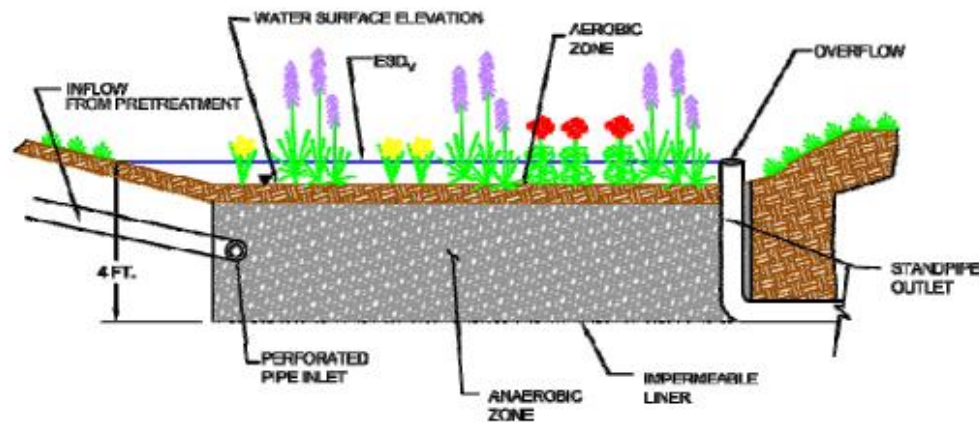


# Submerged Gravel Wetlands

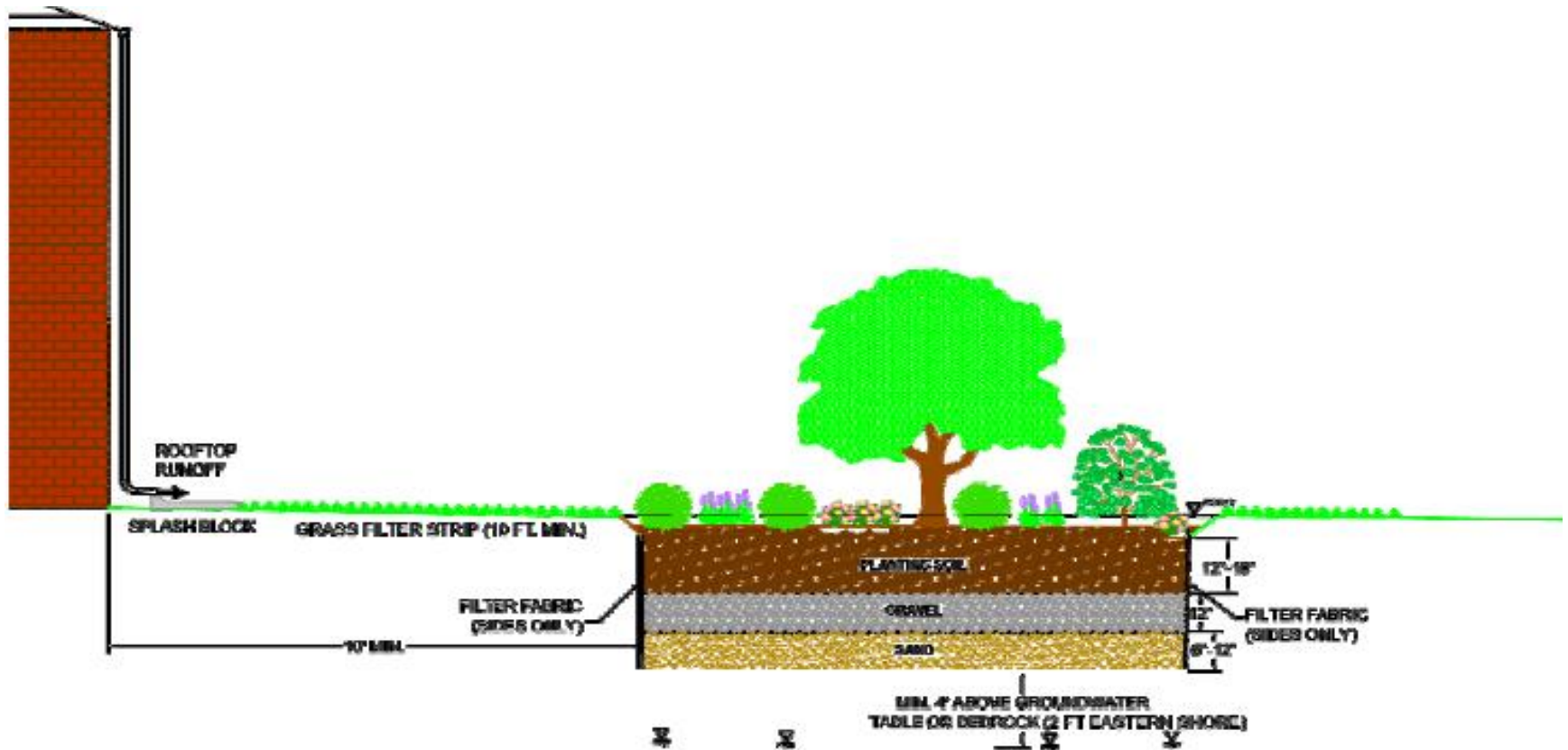
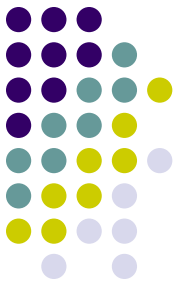
- Designed for poorly drained soils

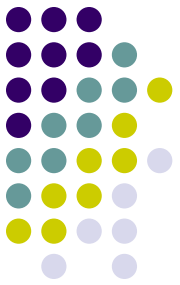
Maintenance:

- Remove sediment accumulation
- Wetland plants must be maintained
- Inlets and outlets must be kept free of debris



# Landscape Infiltration



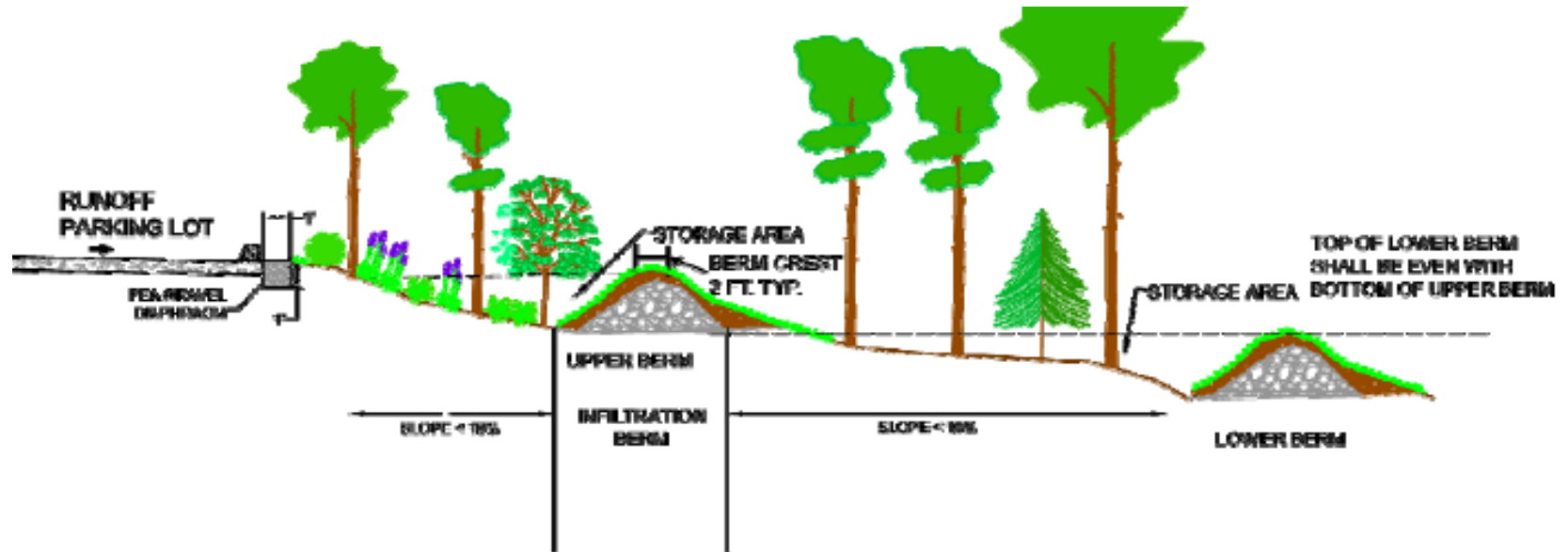
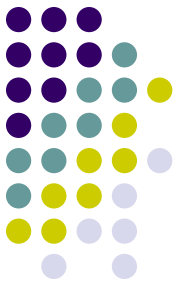


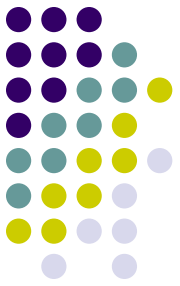
# Landscape Infiltration

## Maintenance:

- Sediment to be removed on the surface and replaced with 2-3" of new material
- If water ponds longer than 48 hours, or if there is algal growth, remove and replace the first few inches of planting soil
- If ponding persists, the gravel, soil, and sand may need to be replaced and/or cleaned

# Infiltration Berms



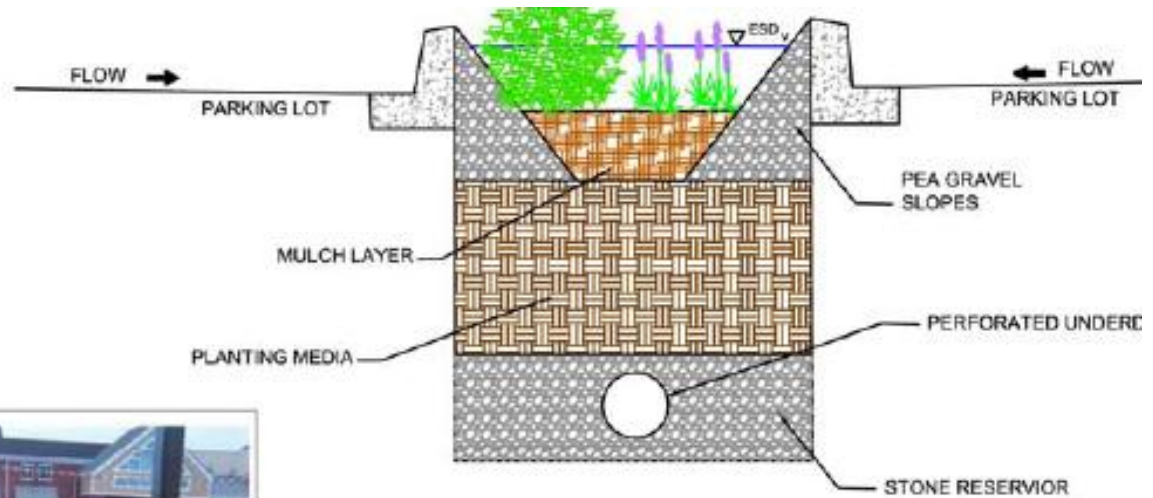


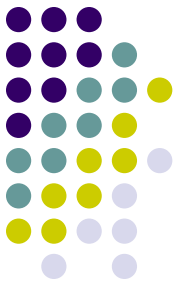
# Infiltration Berms

## Maintenance:

- Inspect regularly for ponding water
- Repair erosion areas
- Maintain vegetation

# Bioretention





# Bioretention

## Maintenance:

- If water ponds longer than 48 hours, or if there is algal growth, remove and replace the first few inches of planting soil
- If placed in parking lots, the top mulch should be replaced annually, otherwise, the top 2-3" should be replaced annually